

WHAT IS CLAIMED IS:

1. Apparatus for displaying a three-dimensional image, comprising:

5 a plurality of lenslet pixel modules with each module defined in part by a respective lenslet;

each lenslet pixel module corresponding with a pixel of the three-dimensional image;

10 a plurality of two-dimensional moving image sources associated with and forming a portion of the lenslet pixel modules; and

the lenslet pixel modules cooperating with each other to form a projector array for displaying the three-dimensional image.

15 2. The apparatus of Claim 1 further comprising a fly's eye lens sheet having a plurality of fly's eye lenslets disposed thereon to provide the respective lenslet for each lenslet pixel module.

20 3. The apparatus of Claim 1 further comprising at least one lenslet pixel module having a partially silvered mirror and a sensor disposed adjacent thereto.

4. The apparatus of Claim 1 further comprising at least one lenslet pixel module having a high resolution two-dimensional digital image source associated with and forming a portion of the at least one lenslet pixel  
5 module.

5. The apparatus of Claim 1 further comprising:  
the plurality of lenslet pixel modules disposed in an array relative to each other;  
10 at least two of the lenslet pixel modules having a respective sensor disposed therein;  
the sensors cooperating with each other to form a sensor array having a first focal plane;  
the plurality of fly's eye lenslets associated with  
15 the lenslet pixel modules cooperating with each other to form a projector array having a second focal plane; and  
the focal plane of the sensor array corresponding generally with the focal plane of the projector array.

20 6. The apparatus of Claim 5 wherein at least one sensor comprises a video sensor.

7. The apparatus of Claim 5 wherein at least one sensor comprises a charge coupled device.

25 8. The apparatus of Claim 1 wherein the three-dimensional image is full parallax.

9. The apparatus of Claim 1 further comprising:  
the plurality of lenslet pixel modules disposed in  
an array relative to each other;

at least two of the lenslet pixel modules having a  
5 respective sensor disposed therein; and

the sensors cooperating with each other to form a  
sensor array for sensing at least one real three-  
dimensional object.

10 10. The apparatus of Claim 9 further comprising a  
central processing unit operable to receive information  
from the sensor array and to provide information to the  
projector array to allow interaction between the at least  
one real three-dimensional object and the three-  
15 dimensional image.

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20 11. The apparatus of Claim 1 further comprising the  
high resolution two-dimensional image source selected  
from the group consisting of a cathode ray tube, a liquid  
crystal display, digital micro device mirror, a flat  
panel display, a respective section of a diffuser  
backlit by a video projection system, a  
microelectronicmechanical system, or a light emitting  
diode.

12. The apparatus of Claim 1 further comprising:  
the plurality of lenslet pixel modules disposed in  
an array relative to each other; and

5 a high resolution two-dimensional image source  
associated with each respective lenslet pixel module.

13. The apparatus of Claim 1 further comprising:  
the plurality of lenslet pixel modules disposed in  
an array relative to each other;

10 a two-dimensional high resolution image source  
associated with two or more lenslet pixel modules; and

each of the lenslet pixel modules associated with a  
dedicated region of the respective high resolution two-  
dimensional image source.

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14. The apparatus of Claim 1 further comprising:  
the plurality of lenslet pixel modules disposed in  
an array relative to each other;

20 a plurality of sensors interspersed within the array  
of lenslet pixel modules;

the sensors cooperating with each other to form a  
sensor array having a first focal plane; and

25 the lenslet pixel modules cooperating with each  
other to form a projector array having a second focal  
plane.

15. The apparatus Claim 14 further comprising the focal plane of the sensor array corresponding generally with the focal plane of the projector array.

5 16. The apparatus of Claim 14 further comprising the focal plane of the sensor array having an orientation different from the focal plane of the projector array.

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17. A system for presenting a scalable,  
autostereoscopic image comprising:

a plurality of lenslet pixel modules with each  
module defined in part by a respective lenslet;

5 each lenslet pixel module corresponding with a 3D  
pixel of the autostereoscopic image;

a plurality of two-dimensional image sources  
associated with and forming a portion of each lenslet  
pixel module; and

10 at least one computer processing unit providing an  
input to the two-dimensional high resolution image  
sources.

18. The system of Claim 17 wherein the input  
15 supplied to the two-dimensional image sources comprises  
digital data corresponding to a two- dimensional image.

19. The system of Claim 17 wherein the input  
supplied to the two-dimensional image source comprises a  
20 moving video image.

20. The system of Claim 17 wherein the  
autostereoscopic image is full parallax.

21. The system of Claim 17 further comprising:

5 a plurality of first computer processing units  
having at least one video output channel to supply video  
images to the high resolution two-dimensional image  
sources;

two-dimensional image source coupled with one of the  
first computer processing units; and

a master computer processing unit coupled with and  
supplying data to the first computer processing units.

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22. The system of Claim 17 further comprising:

a plurality of sensors with each sensor disposed  
within one of the lenslet pixel modules; and

15 each sensor coupled with the computer processing  
unit to provide information to the computer processing  
unit concerning a real object in front of the lenslet  
pixel modules.

20 23. The system of Claim 17 wherein the lenslets  
further comprise a plurality of lens selected from the  
group consisting of cylindrical, convex, concave,  
gradient index, diffractive, refractive, holographic  
optical elements and other prisms which form an  
autostereoscopic image.

24. The system of Claim 17 further comprising:  
a plurality of sensors with each sensor coupled with  
the computer processing unit to provide information to  
the computer processing unit concerning a real object in  
5 front of the lenslet pixel modules;  
a portion of the sensors providing high resolution  
information about the real object; and  
a portion of the sensors providing low resolution  
information about the real object.

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25. A method for presenting an autostereoscopic image comprising:

combining a plurality of high resolution two-dimensional digital image sources with a plurality of lenslet pixel modules with each pixel module having a respective fly's eye lenslet; and

projecting light from each digital image source through the respective lenslet pixel module to form the autostereoscopic image.

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26. The method of Claim 25 further comprising installing at least two sensors within respective lenslet pixel modules for use in sensing at least one real object disposed in front of the lenslet pixel modules.

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27. The method of Claim 25 further comprising: sensing at least one real object disposed in front of the lenslet pixel modules with the sensors; and

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combining information received from the sensors concerning the at least one real object with information supplied to the high resolution two-dimensional image sources to allow interaction between the at least one real object and the full-parallax autostereoscopic image produced by the lenslet pixel modules.

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28. The method of Claim 25 wherein the autostereoscopic image is full parallax.

29. A lenslet pixel module for projecting light and sensing light comprising:

5 a two-dimensional image source operably coupled with a respective lenslet whereby a portion of a selected two-dimensional image may be projected from the lenslet to form a portion of an image;

a sensor disposed within and forming a portion of the lenslet pixel module; and

10 the sensor operably coupled with the fly's eye lenslet to allow the sensor to detect at least one real object in front of the lenslet pixel module.

30. The lenslet pixel module of Claim 29 wherein the sensor further comprises a digital video camera.

31. The lenslet pixel module of Claim 29 further comprising a portion of a full parallax three-dimensional electronic display.

32. The lenslet pixel module of Claim 29 further comprising the two-dimensional image source operable to form a portion of the image and the sensor operable to detect electromagnetic radiation from the at least one real object at substantially the same time.